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A Portable uClinux Development Environment on a Windows PC

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Summary

Configuring and building a uClinux kernel has traditionally required a Linux workstation because the tools that work on the kernel sources are designed for Linux and Linux-like environments. However, a Linux workstation may not always be readily available. This Application Note describes using a Linux Virtual Machine (using VMware tools) that can run on a Windows XP PC. The virtual machine can be used as a portable, self-contained and compact development environment for uClinux, and can easily be shared or distributed among developers.

Introduction

Table 1 lists the hardware and software requirements necessary to follow the procedures in the document.

Table 1: **Required Hardware and Software Tools**

Required Tools	Details
Windows XP Host Machine with 5 GB of free space on internal or external HDD	At least 5 GB of memory is required to hold the image of the Linux Virtual Machine.
Linux Virtual Machine (VM)	This pre-built image contains the uClinux development environment. It can be used to perform uClinux kernel and application development tasks. Refer to "Running Linux Virtual Machine Using VMware Player" for more details

Table 2 lists the topics covered in this Application Note.

Table 2: **Topics Covered in the Application Note**

Tasks	Time Required
Installing the VMware Player	10 minutes
Running the Linux VM	10 minutes
Setting the uClinux development environment on Linux VM	10 minutes
Using the Linux VM for uClinux development	N/A
Exiting the Linux VMware Player	1 minute

Installing VMware Player

VMware Player is a free application that is required to play the Linux Virtual Machine (VM). In this lab, the VMware Player is installed on a Windows PC.

1. Download the free VMware player for Windows PC from the VMware web site:

   http://www.vmware.com/download/player/
2. Install the VMware Player on a Windows PC.

Note: You may *select* to disable the CD-ROM Autorun capability. If this option is not disabled, it might cause unwanted effects when booting the Linux VM.

Running Linux Virtual Machine Using VMware Player

The Linux VM runs a CentOS 3 Linux distribution.

- **Version:** Built using VMware Workstation 5.5.0
- **Devices:** Single Processor, CD-ROM, Ethernet, USB controller and Audio
- **Memory:** Hard Disk - Max 16 GB (not pre-allocated), Memory - 512 MB

1. Download the Linux VM zip file from three files on the Xilinx ftp site.

   ftp://ftp.xilinx.com/pub/applications/xapp/xapp934_1.zip
   ftp://ftp.xilinx.com/pub/applications/xapp/xapp934_2.zip
   ftp://ftp.xilinx.com/pub/applications/xapp/xapp934_3.zip

   Unzip the contents of the zip file on to a stable storage device. You can use an external HDD for this purpose. Assume the VM directory is E:\Xilinx_VM\.
2. Launch the VMware Player. Open the “Xilinx_CentOS3_ Linux.vmx” file in the VM directory.

   The VMware Player will now play the Linux VM. You should see CentOS Linux boot up and display a login screen.

   Note: Remove any disks in your CD-ROM drive.
3. Login to Linux VM as user “devel” with password, “devuser”. The root password for this VM is “uclinux”. You can login as root if you want to configure or change system settings in the VM.

You are now ready to use the uClinux development environment on the Linux VM.

Setting up the uClinux Environment

The Xilinx VM includes pre-packaged uClinux sources and tools. The GNU compiler tools are based on EDK 8.2i. The following directories host the various components and serve various purposes:

- **/home/devel/uclinux:** Top level of the uClinux development environment
- **/home/devel/uclinux/src:** uClinux kernel source and distribution
- **/home/devel/uclinux/bin/mbtools:** MicroBlaze™ GNU tool chain
- **/home/devel/cdrive:** Mount point for Windows PC 'C' drive
- **/home/devel/bin:** Setup scripts and utilities

Note: You might want to update the uClinux sources provided with the Xilinx VM. You can obtain the sources from the uClinux CVS and update the files in your VM at any time. You can also update the Xilinx MicroBlaze GNU tool chain with any later versions you want to use.

Transferring Files

When performing typical uClinux developer tasks, you are required to transfer files into and out of the VM. To do this, you must setup a mount point for your Windows "C:" drive within the VM, as described in the following steps:

1. Type *"smbmount '//<Windows PC IP address>/C$' /home/devel/cdrive -ousername='<Windows Domain>\<Windows login name>',uid=devel, gid=devel"*

   Example:

   smbmount '//192.168.93.195/C$' /home/devel/cdrive -ousername='myname',uid=devel, gid=devel

2. When prompted for the password, type your Windows password. If the command succeeds, you should see your "C:" drive mounted at "/home/devel/cdrive/". Make sure that you are able to read and write to Windows "C:" drive from the VM.

   Note: If you do not see the entire "C:" drive shared at the mount point, restart the Linux VM. Follow these steps to restart:

   a. Select Start -> Log Out, click Close Current Session.

   b. Click Reboot on the Login prompt.

   c. After the Linux VM reboot, login as devel and follow the steps to mount 'C' drive.

Using the VM for uClinux Development

Please refer to XAPP730 "Getting Started with uClinux on MicroBlaze" for a detailed introduction to common uClinux tasks (you can perform these tasks from within the Xilinx VM).

Exiting VMware Player

You can end the VM session at any time by exiting the VM. Since the entire VM session state is stored onto the single image file, you can share your work with other developers by providing access to the saved image file. You can either power-off the VM or suspend it. Suspending freezes the VM for quick restoration at any time. You can change the default exit behavior by selecting Player -> Preferences and changing the Exit Behavior to "Suspend the Virtual Machine". For more information refer to:
http://www.vmware.com/support/pubs/player_pubs.html

Conclusion

This Application Note describes how to install VMware Player and use the Xilinx VM for uClinux development. This allows you to get started quickly with uClinux on MicroBlaze using a Windows PC.

References

1. XAPP730 *Getting Started with uClinux on the MicroBlaze Processor*
2. VMware (http://www.vmware.com)
3. uClinux (http://www.uclinux.org/pub/uClinux/ports/microblaze/)

Note: Xilinx Technical Support does not support issues with uClinux or VMware.

For VMware-related support, see:

http://www.vmware.com/support/

For uClinux-related support, see:

http://www.petalogix.com/

Revision History

The following table shows the revision history for this document.

Date	Version	Revision
9/29/06	1.0	Initial Xilinx release.